

Pioneer Prefabs in Honolulu

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The prefabrication of American buildings goes back to the beginnings of trans-Atlantic immigration. Framed houses were an early article of overseas trade, and before long the American colonies, in their turn, were making and shipping houses to the Caribbean sugar islands. After that both Europe and our Eastern Seaboard produced them for the settlement of Australia and California. At the height of the Gold Rush in 1849 port cities around the world were sending large numbers of buildings to San Francisco. Hawaii—and especially Honolulu—was soon to share them.

The spectacular development of this industry in the middle nineteenth century was made possible by the proliferation of steam-powered saw mills and woodworking factories at shipping points and by the increasing size of cargo ships. Rapid advances in the techniques of rolling iron allowed metal houses to become both feasible and popular after 1840.

HONOLULU HARBOR

Honolulu Harbor was discovered at the end of the eighteenth century and soon became a place of importance. On the waterfront buildings with wooden walls soon dominated, while adobe and stone types trailed. But such wooden houses were hard to come by, for there never were many good timber trees on the island of Oahu. Boards were highly prized. Even the natives had a difficult time getting large enough poles to frame their grass houses. The dilemma was noted in 1823 by the Reverend Charles S. Stewart, newly arrived at the American Mission:

We are at a loss [wrote Stewart] to determine what the materials of our permanent dwelling shall be. If constructed of wood, every part must come from America,

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the Islands affording no timber for house building, that is accessible, or to be obtained for a reasonable price.¹

Even shipwrecks were eagerly sought after, and the Mission bought the remains of the ship *Ruby* to saw the masts into boards and make door and window frames.²

One of the first houses at Honolulu was a prefabricated import from Russian Alaska. The town was no more than a new cluster of grass huts on the harbor's edge when the frigate *Neva* arrived from Sitka in January of 1809. The native monarch Kamehameha had only recently moved from Maui, and for the royal residence had only a clutch of native style houses. But as he was paddled out to meet Captain Leontii Hagemeister's ship he was wearing a blue coat and grey pantaloons. To go with this European finery he was soon to acquire a frame house.³

The Russians at that time had wide commercial and territorial ambitions in the Pacific and had earlier visited the islands enroute to their Alaskan colony. "The American Company", as it was called, had been actively trading in furs with British and Yankee ship captains on the mainland and was then moving South towards the California fur hunting grounds. Hopeful of setting up a station in Hawaii for growing food-stuffs—and to edge into the profitable Chinese sandalwood trade—Governor Baranov had dispatched Hagemeister to the islands.⁴ Archibald Campbell, later to write an account of his travels, came to Honolulu on this ship, noting that they had "a house in frame on board"—along with adzes, hatchets, teeth of the sea-horse and "other articles suited to that market". In the face of local hostility the Russians were not able to establish a foothold but the king, a shrewd trader, got the house, and the next year it was set up. Leaving Honolulu, Campbell noted that construction was already up to the top of the first story. The royal navy yard had stopped work so the carpenters could put up the royal residence.⁵

Foreign residents were not then allowed to erect permanent houses in Honolulu, but three years later pioneer resident Francisco de Paula Marin, a trusted associate of the king, noted in his *Journal* that he had "made a Contract for a house all of wood for a piece of iron and three fathoms of White Cloth".⁶ From whom it was bought or what it was like is not revealed. Then the Boston sandalwood trader, Captain Nathan Winship, who had an establishment next door to Marin about the years 1811–1816, put up a frame house.⁷ These were very early buildings about which little is now known.

Another early landmark on the waterfront was the two-story house of Boston traders Marshall and Wildes, later to become the American Consulate. Its erection was begun on September 27, 1819.⁸ An old account

book preserved at the Hawaiian Historical Society lists the materials used, which included two frames at \$200.00, five thousand feet of lumber at \$100.00, four casks and 25 pounds of nails at \$75.00, 20,000 shingles, one box of glass and a case of "paper hangings" (or wallpaper). Freight from America, apparently brought out on the company's ship, the *Paragon*, was charged off at \$500.00. Edward Jackson, best known of Honolulu's early carpenters, got ninety dollars for his work in putting it up, in which he was assisted by three others.⁹

The lower part of this building was used as a store, the upstairs for the entertainment of friends and prospective customers. "The upper room", wrote John Coffin Jones, Jr., "is furnished in an elegant style and much admired by the Chiefs".¹⁰ This exotic structure—with the first wallpaper to reach Hawaii—created a new level of consumption, judging by the number of frame houses sold to the native aristocracy in the next few years.

The thirst for novelties from overseas was never satisfied, but the waterfront traders did their best. The king's own ship, the *Thaddeus*, had just returned from Kamchatka with two deer and two bears, which caused a sensation.¹¹ Marshall and Wildes offered ready-made houses, which included a small blockhouse, a ten-foot house frame (on the *Neo*),¹² and another (on the *Inore*) finished up "in an elegant style" which the king was persuaded to buy. Daniel Castle, an outsider, edged in on the local market with a small frame house for the high chiefess Kaahumanu, who was so pleased that she tried to persuade him to stay on the Islands.¹³ Tamoree, King of the Island of Kauai, a rival of Kamehameha, naturally had to have one, too.

But talk originating at the new Mission seems to have had a depressing effect on the market for such buildings. As Jones wrote back to Boston:

... the house we are building rapidly; I do not think it will command any price; the native boys belonging to the Mission family, have told the King and chiefs that such houses are bought for 300 \$ in America, they are not therefore disposed to give a price, they made an offer for the house out in the Neo, of 40 piculs. . .¹⁴

of sandalwood for the Canton trade. It was not long before Boston was advised not to send any more house frames.¹⁵

In the meantime the newly founded American Mission at Kawaihau just east of the harbor had got its first frame house. The missionaries' wives were the first white women to live in Hawaii, and crowds followed them out of sheer curiosity. Their protection and welfare was a matter of great concern back in New England. As the Reverend Hiram Bingham wrote:

The plan of taking females from this country to live or die among the barbarians of Hawaii, appeared to many objectionable and forbidding. It was deemed advisable to send out the frame of a house for the accommodation of the mission in their new abode. This was subsequently transported to the islands, gratuitously; through the generosity of Messrs. Bryant and Sturgis, of Boston, prompted by sympathy for the females of the mission.¹⁶

In practice, the erection of these Yankee-style houses posed many problems. The frame and other materials sent to the Mission had arrived from Boston on Christmas Day, 1820 by the Brig *Lascar* and the Ship *Tartar*, but it was some weeks before the King would permit its erection. Construction did not begin until April, and the frame had by that time been injured by exposure to the tropical sun. The boards for the roof could not be found, and it was concluded that they were never put aboard ship. Other lumber had been damaged enroute, and some was stolen after arrival at Honolulu. The balance had to be eked out by boards purchased locally. During the shingling the scaffolding collapsed, injuring one of the men. The siding of rough feather-edged boards proved leaky, and attempts were made to stop the cracks with rags soaked in tar.¹⁷

Despite these troubles the structure was completed and occupied the same year. It stands today in restored condition as a major historical landmark on King Street.¹⁸

The architectural pretensions of Honolulu were described by the Reverend Stewart in his best chamber of commerce style:

Kaahamanu has also had a new house built during the year; it is of wood and was prepared in all its parts for erection, before it was brought from America. It is well papered and varnished, and in its dimensions and general appearance, similar to some of our best wooden houses at Cooper's town. These two buildings, with the *consulate*, which is also a two-story frame house, a smaller one belonging to Kaahumanu, and the two Mission houses, give quite an European aspect to the town; and while they render it more picturesque, by the contrast with the native huts, afford evidence of the civilization to which the nation is approaching.¹⁹

This house had been bought from an American speculator for "a considerable price".²⁰

A complete house for Stewart was sent out in 1825, and a list of its parts and their cost has fortunately been preserved among the missionary records:

Cost of House for Rev. C. S. Stewart

1825]	For 4515 feet Pine timber, B.M. @\$16	-	\$ 27.09
Nov. 17]			
	1278 ft D ^o . Joist @ 9	- - -	11.50
	474 ft Hem. tim. B.M. 12/	- - -	9.48

1590 ft Ref. clean boards @ \$9	-	14.31
13000 shingles @ 16/7 ^m d° @ 13/	-	49.84
9557 ft Merch. Boards @ 8 1/2	-	81.23
2 doors @ 18/ - 6 d° @ 12/	-	18.00
378 Sash lights @ 4 1/2 4 boxes 6/	-	24.62
18 Window frames @ 6/2 d° 4/6	-	19.50
2 ^{lb} . Nails @ 8 cts. 1 ^{lb} . chalk @ 4 cts		20
5 gal. N. Rum @ 46 cts use of bench 6/		3.30
Amt. paid for hauling timber & boards		3.00
Do Sundry persons for work	- -	57.34
for Boards for Wf. & Surv. 4.15	-	15.15
for Freight no d°	- - -	77.59
		<hr/> 412.15
		99.09*
		<hr/> \$511.24 ²¹

* Paints, Oil, Locks, Latches, Nails, Glass &c

* These went in the Sch. Missionary Packet

Skilled labor was always scarce in Honolulu. The more complete the house parts as received, the cheaper the finished product. "Carpenters' wages are enormously high," wrote Levi Chamberlain home to Henry Hill, "Three dollars a day" [!].²²

One of the best known frame buildings of this type was the Seaman's Bethel, which went out from New London with the Reverend John Diell in 1832. It was erected in the summer of the following year, "without the aid of ardent spirit," wrote Diell with satisfaction.

It is of wood, the roof covered with zinc, with a basement of stone. It is forty-eight feet long, and thirty wide, calculated to seat five hundred persons. The basement affords good rooms for a reading-room for officers, and another for seamen, with a private study where the minister can meet those who may wish to converse with him. The cost of the building, in addition to the materials carried from this country, will not exceed \$1800.²³

Here again an important item had been left behind—this time the ceiling boards—so the church had to be finished (at a higher cost) with plastering. It was dedicated November 28, 1833.²⁴

Honolulu continued to use such prefabricated structures. About 1834 Captain Joseph Carter put up on Beretania Street a wooden house shipped out from Boston,²⁵ and the *Polynesian* for July 22, 1848 carried an advertisement for another 20' × 35' in size, with a six-foot verandah.

.....the frame is of spruce, of a large size, and well braced, being intended to resist the hurricanes of the tropics . . . all in perfect order; having been built in the United States, and not set up. The style of framing may be seen from the original plans by applying to S. H. Williams & Co.²⁶

The problems of sun and trade winds had been kept in mind by at least one designer, for when Charles Brewer's house (brought out in frame from the United States) was advertised for sale in 1846, an advertisement in the *Sandwich Islands News* could declare that it "was planned expressly for this climate. It contains seven pleasant and airy rooms, a cellar and convenient out buildings and bathing room attached".²⁷

These traditional frame houses as brought to Hawaii were a common product of carpenter shops on the American East Coast. In any case, the heavy mortised and tenoned frames used in those days had to be specially pre-fitted in a timber yard before they were hauled to the site of erection. Loading them aboard a ship was only a further step in a familiar process. As to the cladding of these frames with boards, it was also economical to finish in advance as much of the lumber as possible to save shipping space as well as carpenters' work at the site.²⁸ The making of doors and windows offsite was common practice, especially after the invention of steam-powered woodworking machinery. Glass, almost universally cut to standard sizes (in multiples of two inches), customarily came packed in wooden cases.

AUSTRALIA AND SECTIONAL HOUSES

In the meantime the colonization of Australia had stepped up the prefabrication industry in Britain, and the new steam-powered mills for sawing, planing, molding and morticing woodwork brought forth more sophisticated designs with *panelled* walls. This was to be followed by new techniques for casting and rolling iron which produced factory-made components all the way from machine-made nails and bolts to cast and wrought columns and beams. Most important of all were the sheets of corrugated and galvanized iron so practical for cladding walls and roofs.

British settlements in the Southwest Pacific were benefited by these inventions. As early as 1790 a prefabricated hospital designed by the young London architect, Jeffry Wyatt,²⁹ together with a storehouse and some cottages, had been shipped out to Sydney, recently established in New South Wales. As the building industry developed there, Sydney was soon able to supply wooden houses for Newcastle up the east coast and for the island of Tasmania to the south.

The so-called *sectional* house first made its appearance in Australia a generation later. A London builder by the name of Henry Manning invented a "Portable Cottage for the Use of Emigrants and others" which

was announced by the eminent architectural writer and publisher, John Claudius Loudon, in glowing terms:

The principle object of this portable cottage is, to supply emigrants with comfortable and secure lodgings immediately on their arrival at a foreign settlement. It is well known that in all new countries, the rent of houses or lodgings is extremely high: it follows, therefore that when an emigrant arrives with his family at the sea-port town of the country where he is to be put in possession of a grant of land, he must take a lodging for his family and goods; probably for some weeks, or even months, till he has visited the interior of the country, examined it, and fixed upon the situation of his future residence. A single room at Hobart Town in 1830, was often let at £1 a week; hence it may be easily conceived that a portable cottage, like that given in this Design, which costs in London £50, will afford, though only containing two rooms, a considerable saving to a family of three or four persons of different sexes. Security from thieves, and protection from vermin, are also other recommendations. . . .

As secondary uses of a portable cottage, we may mention, that it may be carried in ships making long voyages, for the purpose of being set up on shore wherever any stay is made, either for the benefit of invalids, or the use of scientific persons; that it may be employed as a shooting-box, wherever there are tolerable roads, as it weigh little more than a ton, and might therefore be easily drawn by one horse.³⁰

These sectional houses made their first appearance at the Swan River settlement in western Australia, where one of Manning's sons erected some of them.³¹ The designs, incidentally, were to be pirated soon afterwards by a Baltimore architect, John Hall, in a little book unashamedly titled *A Series of Select and Original Modern Designs for Dwelling Houses*.³² While it might be difficult to learn the extent of Manning's production (they were advertised in Australian newspapers for several years) there is no question that the invention was followed by many ingenious types of ready-made houses all the way down to modern times.

As will be seen later, the panelled house was to show up in Honolulu as an aftermath of the Gold Rush. At the same time, the wooden house in its simplest traditional terms of morticed frame, board siding and wooden shingles was still made in the less highly developed countries, allowing them to participate in this international trade.

THE CALIFORNIA GOLD RUSH

That the Gold Rush gave great impetus to the idea of prefabrication is shown by an article in Honolulu's *Polynesian* for March 2, 1850:

A New Article in Commerce.—From all parts of the world we hear that HOUSES, in perfect order to be set up in a short time, are being constructed for California. From the humble wooden tenement of a single room to immense iron and framed

buildings of three stories, and of almost every possible form of construction. Belgium, France, England, the British Colonies, the South American States and China, are all sending their quota; and the following article will show that from New York and its immediate vicinity alone, 5,000 houses have been, ere this, shipped for El Dorado. Boston, and contiguous places, in Massachusetts and Maine have probably exceeded New York and vicinity; so that an immense city will have been shipped to that country, from all parts of the earth, and the cities and towns that are there springing up, will be composed of more diverse materials than any others ever built. Altogether, California will prove an anomaly in architecture, as it is in every other respect. The ships required for the transportation of houses alone, would form a large fleet, and commerce, connected with the wants of California emigration, has received an impulse, and given vigor to ship and steamboat building, particularly in the United States, altogether unprecedented in that country. The papers abound with notices of new ships and steamers in process of building, or of launches to take place, to an extent before unknown; and many of them are of the largest and most expensive class. Success to them.³³

Two weeks later an advertisement for an auction of thirteen houses at Honolulu "in frame" shows that the California market was indeed spilling over into the islands.³⁴

Some of these houses had been carried over the Isthmus of Panama on muleback and the rest went around the Horn. The newspapers and customs records³⁵ of San Francisco describe a variety of types as they were unloaded there. Gold dust was plentiful and the demand great. For a time there were enormous profits in the business, certain sales bringing as much as fourteen times the New York price.

It was too good to last. By March of 1850 the California lumber industry, undeveloped by the earlier Spaniards, was producing enough to compete with the imported houses. The building materials market was oversupplied,³⁶ and ships had to sell their houses at a loss or carry them away to other markets. Some came as far as Honolulu.

An English firm ran the following advertisement in the *Honolulu Times*:

FOR SALE

A lot of very superior houses of the following dimensions, will be sold at auction by order of the undersigned, ex British brig "Fanny", from Aukland, as soon as landed, if not previously disposed of by private contract; 6 houses 20 × 12, 8 feet high: 2 houses 20 × 12, 7 feet 6 inches high: 6 houses 14 × 12, 7 feet 6 inches high: 1 do 18 × 10, 7 feet 6 inches high: 1 do 10 × 10 6 feet 6 inches high, pannelled; 3 do 12 × 10, 12 feet high, two stories. The above houses are partitioned, and several will be put up in order to show intending purchasers their superiority over any houses that has as yet been offered for sale here. ALSO—15000 bricks, 8000 shingles, and a few tons of coal.

STARKEY, JANION & CO.³⁷

In the same year we also find buildings with pine fronts "Per Aurigo, from Hobart Town and San Francisco",³⁸ "4 Roxbury cottages, complete, with windows, doors, blinds, shingles, partitions, flooring and covering, 36 × 17 . . ."³⁹ "ALSO FOR SALE—A new CHINA HOUSE, 12' × 24; in good order to be put up immediately, with hinges, bolts, screws to accompany . . ."⁴⁰ and "One American house frame 28 × 20 suitable for a store".⁴¹ The Paul Emmert lithographic views of 1853—especially No. 6—show numbers of small nondescript houses, many of them occupied by prominent Honolulu citizens.⁴² It seems likely that these are examples of prefabricated houses put up singly or in groups and embellished with porches and lattice screens to suit the owners' fancy.

Yankee Merchant Stephen Reynolds, who frequently dabbled in the building business, took a great interest in these new houses. He made a number of references to them as they began to arrive in March of 1850. On the ninth he noted the *Eudora Guthrie* from Hobart Town, Tasmania with forty houses "all framed, with lumber to finish" and the fifteenth, the Brig *Enterprise* landing more of the same.

It was a common custom in Honolulu to dispose of ships' cargoes at auctions, and Reynolds went to two of them. Prices were low—New Zealand houses going for only \$250 and Hobart Town blue gum frames with boards and shingles, slightly less.⁴³ Reynolds, shrewd trader that he was, considered them cheap but bided his time.

The west-bound Pacific ships were dropping their prices rather than return home with their houses. On the seventh of May, Reynolds noted more arrivals from New Zealand carrying houses, potatoes and onions. On the twenty-second he finally bought a Hobart Town house for only \$103.00. This house, two stories high and consisting of two hundred pieces with plans included, was reputed to be 16' × 36' in size. Reynolds employed one Fales to assemble the house for the sum of three hundred dollars. When raised it was found to be only 13'-10" × 28'. "A Scotch cheat," observed Reynolds sourly. By the purchase of floor boards and lumber for a verandah the new house was made ready by the middle of summer.⁴⁴

All of Honolulu seemed to be taking advantage of the bargain housing. Nearly four hundred frame houses were put up in a single year⁴⁵—fifteen times as many as had been erected in the first half century of Honolulu.⁴⁶ "Persons returning, after an absence of a few months, are hardly able to identify the place", declared *The Polynesian*, "so many changes have taken place".⁴⁷ Prefabricated houses had made this boom possible. In after years the ready-made house market tapered off, reflecting the collapse of the demand in California. An advertisement of 1851 is perhaps the last.

Four Roxbury cottages "complete with windows, doors, blinds, shingles, partitions, flooring and covering 36' \times 17' is the last one we have noted.⁴⁸

CHINESE HOUSES, IRON HOUSES

Hong Kong also sent houses, but it is not easy to account for them. The new British port and naval station on a barren island at the mouth of the Pearl River below Canton had been founded only in 1841,⁴⁹ and the builders were having troubles of their own.

The region afforded no native lumber, and the first "mat sheds" put up by the local Chinese were followed directly by brick and stone houses for the trading establishment.⁵⁰ Where the necessary lumber for floors and roofs came from is not clear, but there is no doubt it had to be shipped in.⁵¹ In Hong Kong at that time there were seventeen carpenter shops, but the mechanics were not experienced in European construction, and there were four fatal accidents in one week. The local press charged it to "the wretched ignorance or deplorable stupidity of our Chinese Builders".⁵²

The situation must have soon improved, for two years later Osmond Tiffany, a visitor from Baltimore, noted that buildings "were run up and finished with magic ease". But even in 1850 we find Charles St. George Cleverly, the Surveyor-General, longing for "a good practical workman" such as he had known at home.⁵³

Wooden-walled houses seem to have been more or less unknown on the Chinese coast, and how they were obtained for export in 1849 is not at all clear.⁵⁴ But from the San Francisco newspapers we know that two American vessels arrived there from Hong Kong—the schooner *Petrel* on August 21 and the ship *Mariposa* on September 7—with prefabricated houses.⁵⁵

In any case, the business was considerable. Two hundred and forty-eight wooden houses were *exported* to San Francisco, according to the *Hong Kong Blue Book* for the year 1850, but sixty were *imported* at Hong Kong. This may indicate that one hundred and eighty-eight were sold in California or Hawaii (if not lost at sea) and the balance returned to China as unsaleable. As we have seen, the market for such houses had failed before the end of the year 1849.

The Oriental imports were described at San Francisco as:

generally 20 feet square, one story in height, and 12 feet from the floor to the ceiling. The timbers are round, and many of them very crooked. We have noticed, in several instances, the erection of China buildings of double the size described above—but we suppose that in such cases two separate frames are erected together, thus forming a single building. The first movement after raising the frame is to

attach the window, which consists of a frame and blinds, without sash. The blind is so constructed as to close itself by its own weight—the slat being of double width outside. The timber is very uniform in size, and about six or eight inches in diameter. The boards are well seasoned, and resemble American cedar. The price of a Chinese building, such as we have described, including the erection, is \$1,500. The building however, consists of simply the frame and covering.⁵⁶

Jessie Benton Fremont, who arrived in the summer of 1849 with her celebrated husband, described a Chinese house they had erected in Happy Valley: "It was put up without nails, except the shingling on the roof, all the rest fitting in together like a puzzle, and was of pretty smooth wood, making a very good temporary lodging. . . Our little house had but two rooms, but they were large and clean. . . ."⁵⁷

Some of the Canton houses were accompanied by Chinese carpenters to put them up.⁵⁸

Prefabricated "iron houses" clad with corrugated galvanized sheets were made in great numbers for California by English and American manufacturers,⁵⁹ but only a few of them seem to have found their way to Hawaii. The first notice in the Honolulu newspapers turned up in the *Times* for November 14, 1849 with Sharkey, Janion & Co., local commission merchants, advertising two expected on the *Daniel Grant* from Liverpool.

In the following year, they were advertised in the *Polynesian* by a California dealer:

W. H. PALMER

Is appointed agent for the SALE of IRON HOUSES from a first rate American Manufacturer, they are fire proof, easily erected, and very economical; sizes vary from 10 × 12 to 15 × 40. These houses are admirably adapted to the Sandwich Islands, and will be put on board free of extra expense, and warranted complete. San Francisco, May 11, 1850.⁶⁰

These iron structures did better than wooden ones on the California market, but at least one of them reached Honolulu, "complete, and tools for putting it together".⁶¹ It was a warehouse 30' × 50' advertised for sale "at a bargain" by W. S. Anner & Co. A prejudice against the unfamiliar appearance of this material seems to have stood in the way of its early popularity.⁶²

Nearly a century was to pass before the United States Navy would flood the entire Pacific with the "Quonset hut", a round-topped, corrugated iron house, demonstrating again the great boon of prefabrication for people in a hurry on distant shores.

NOTES

- ¹ Charles S. Stewart, *Private Journal of a Residence in the Sandwich Islands during the Years 1823, 1824 and 1825* (London, 1828), p. 240.
- ² Chamberlain to Hill, August 29, 1823, Harvard, Houghton Library, *Sandwich Islands Mission, Mission Houses, Honolulu* (MS), Mar. 20, 1823.
- ³ Kamehameha already had a brick "palace" at Lahaina and a stone warehouse at Honolulu.
- ⁴ Hector Chevigny, *Russian America* (New York, 1965), pp. 128, 129.
- ⁵ Archibald Campbell, *A Voyage Round the World from 1806 to 1812* (Edinburgh, 1816), pp. 107, 117, 129, 213.
The writer has no knowledge of prefabrication practices in Russia but has noted that a visitor to St. Petersburg in the 1730's reported log houses being sold in markets "ready-made like rabbit-hutches to be put up in a day on any desired site" and were springing up "like mushrooms". Christopher Marsden, *Palmyra of the North, the First Days of Petersburg* (London, 1942), p. 143.
- ⁶ Marin, *Journal* (Wyllie trans.), *Paradise of the Pacific*, 49:18, Feb. 11, 1813. For a note on Marin (or Manini, as he was called by the Hawaiians) as a builder see Charles E. Peterson, "Pioneer Architects and Builders of Honolulu", *Seventy-Second Annual Report of the Hawaiian Historical Society for the Year 1963* (Honolulu, 1964).
- ⁷ Testimony offered in the land claim of Kepane Montgomery, Archives of Hawaii, *Foreign Testimony* (MS), I, p. 105.
- ⁸ Marin noted "This day they began the wooden houses of Captain Babcock". The latter was the Honolulu agent of Marshall and Wildes at that time, *Foreign Testimony*, I, p. 42.
- ⁹ This manuscript account book had no title originally. It has been tentatively ascribed to William French, but the writer believes from internal evidence that it was kept by Marshall and Wildes at Honolulu. The items listed are under the dates of October and November, 1819.
- ¹⁰ Jones to Marshall and Wildes, July 6, 1821 in *Massachusetts Historical Society Proceedings*, Vol. 54 (Oct., 1920), p. 35.
- ¹¹ Jones to Marshall and Wildes, Nov. 20, 1821 (Harvard, Houghton Library, *Marshall MSS*, Vol. I).
- ¹² Jones to Marshall and Wildes, July 6, 1821 (*Mass. Hist. Soc. Proc.*), (Oct., 1920), p. 35.
- ¹³ In 1820-21 *Register of Claims to Land, 1846* (MS), I, p. 134. In 1832 Castle contracted to build a sawmill at Hilo on the island of Hawaii.
- ¹⁴ Jones to Marshall and Wildes, Nov. 20, 1821 (*Marshall MSS*, Vol. I) 40 piculs of sandalwood may be estimated at \$400.00.
- ¹⁵ Jones to Marshall and Wildes, Aug. 10, 1823 (*Marshall MSS*, Vol. I).
- ¹⁶ Hiram Bingham, *A Residence of Twenty-One Years in the Sandwich Islands* (Hartford, 1848), pp. 61, 62.
- ¹⁷ *Mission Houses Honolulu* (MS) various items from December, 1820-August, 1821.
- ¹⁸ It was measured and drawn up for the Historic American Buildings Survey in 1966 under the direction of Prof. Woodrow W. Wilkins and the writer and photographed by Jack Boucher.

¹⁹ Stewart, *Journal*, p. 311. According to Marin the house was occupied years later. Charles S. Stewart, *A Visit to the South Seas... during the years 1829 and 1830...* (New York, 1833), II, p. 100.

²⁰ *Voyage of HMS Blonde to the Sandwich Islands in the Years 1824-1825*, n.a. (London, 1826), p. 133.

²¹ HMCS, "Mission Houses Honolulu", (typescript compilation by Margaret S. Schlieff). "Cost of a house frame for Mr. Stewart, Parthian, March 30, 1828."

Stewart left the islands before the house was erected and it was reassigned to the Reverend Asa Thurston, who had it erected at Kailua, on the Island of Hawaii. Levi Chamberlain to the American Board, *Missionary Letters*, Vol. 8, p. 2407.

²² Letter dated July 18, 1827. *Ibid.*

²³ *Sixth Annual Report of the American Seamen's Friend Society* (New York, 1834), p. 7.

The location of this building had its functional aspects. As the Reverend Hiram Bingham wrote, the missionaries had been advised to build it "on the wharf, so near the landing-place that no grog-shop can exist between them. If the chapel and reading-room are not the first good shelter from the sun, much will be lost". (*The Sailor's Magazine*, Feb., 1834, p. 187.)

²⁴ Diell to Hunnewell, Oct. 8 and Dec. 11, 1833. Harvard University, Houghton Library, *Hunnewell MSS*, Box 2, Folder 2. Lime for making plaster was easily available by burning the coral rock found along the shore.

²⁵ G. R. Carter, *Joseph Oliver Carter the Founder of the Carter Family in Hawaii* (Honolulu, 1915), p. 5.

²⁶ P, July 22, 1848.

²⁷ SIN, Sept. 16, 1846.

²⁸ A comprehensive sketch of this business may be found in Charles E. Peterson, "Early American Prefabrication", *Gazette des Beaux-Arts*, New York, Jan., 1948, pp. 37-39. The writer's interest in this subject began many years ago with his discovery of the prefabs being sold on the beach in Honolulu.

²⁹ Sir Jeffry Wyatville (1766-1840), as he became known later, was a prolific architect remembered for his modernization of Windsor Castle for George IV. N. M. Colvin, *A Biographical Dictionary of English Architects* (London, 1954), pp. 736-740.

³⁰ J. C. Loudon, *An Encyclopedia of Cottage, Farm and Villa Architecture and Furniture ect.* (London, 1836), p. 251.

In 1819 Loudon had been impressed by seeing in Switzerland the remains of the 10' square portable cottage used by Napoleon's chief engineer in building the road over the Simplon (*ibid.*, p. 251).

³¹ A carefully documented study of prefabs in early Australia has been made by Professor Gilbert Herbert of Technion Research and Development Foundation Ltd. of Haifa, Israel. It appeared as a typescript titled "Studies in Prefabrication and Colonial Expansion / One. The Portable Cottage", 18 pp, plus notes and illustrations. Undated, received Philadelphia, 1970.

³² Published Baltimore, 1840.

³³ P, Mar. 2, 1850.

This subject is discussed at length in Charles E. Peterson, "Prefabs in the California Gold Rush, 1849", *Journal of the Society of Architectural Historians*, XXIV, No. 4 (Dec., 1965) 318-324.

³⁴ P, March, 1850.

³⁵ These may be examined in the Bancroft Library at Berkeley, California.

³⁶ Salem, Massachusetts, Peabody Museum, *Stephen Reynold's Journal* (MS) Mar. 24, 1850. "Everything dull in California—lumber 40 to 60 per M shingles 5 per M." P, March 30, 1850.

³⁷ *Honolulu Times*, May 8, 1850.

³⁸ P, Sept. 7, 1850.

³⁹ *Ibid.*, April 12, 1851.

⁴⁰ *Ibid.*, Dec. 14, 1850.

⁴¹ *Ibid.*, Sept. 7, 1850.

⁴² These drawings, consisting of "four different sketches of Honolulu and embracing all the principal buildings, classified and arranged as a border", were lithographed in San Francisco and offered for sale later that year. (P, May 15, Nov. 4, 1854).

⁴³ Stephen Reynolds, *Journal*, Mar. 19, 1850. The Hobart Town houses, 12' × 24', with 7½' to 9' walls, were knocked down for \$220 and \$240.

⁴⁴ Various entries in Reynolds' *Journal*. Reynolds also bought some Chinese house frames.

⁴⁵ *Extracts from the Minutes of the General Meeting of the Sandwich Islands Mission, May and June, 1851* (Honolulu, 1851), p. 20.

⁴⁶ Honolulu had 26 wooden houses in 1844. F, Aug. 1844.

⁴⁷ P, Sept. 7, 1850.

⁴⁸ *Ibid.*, April 12, 1851.

⁴⁹ G. B. Endacott, *A History of Hong Kong* (London, 1964), pp. 25-27.

⁵⁰ *The Friend of China and Hong Kong Gazette* (Hong Kong), April 14, 1842, p. 2.

⁵¹ The American ship *Forum* advertised "tongued and grooved planks for flooring and other use, Timber 4 inch to 8 do square" (*Ibid.*, Mar. 31, 1842) but these advertisements do not appear to have been common.

⁵² *Ibid.*, Mar. 31, 1842.

⁵³ London, Public Record Office, Colonial Office, Class 133, *Hong Kong Blue Book*, 1849, (bound ms), pp. 145, 146.

At the end of the year 1849 Lieutenant W. Pedder, R.N., Harbour Master and Marine Magistrate, in the annual *Blue Book* informs us that in addition to the general amenities of 3 portrait painters, 27 opium shops and 40 brothels, the mechanics' community of Victoria and the surrounding villages counted 7 mat shed builders, 111 carpenters, 6 brick and tile sellers, 3 lime burners, 31 bricklayers, 82 stone cutters and 48 house painters. Of dwellings there were counted 1,255 Chinese and 355 European.

⁵⁴ From the returns of arriving ships it may be seen that lumber for Hong Kong came from Australia, Tasmania, New Zealand, the United States, India and Manila.

⁵⁵ Both of these ships had been trading up and down the China Coast, and the writer was partially successful in following them through Hong Kong shipping

news. It seems probable that the question can be solved by further research. It is not unlikely that these small buildings in question were made of lumber from the northwest coast of America, fabricated by Chinese mechanics under the direction of American ships' masters and carpenters. Hong Kong today offers well known bargains corresponding to the low wages that still prevail there.

The first shipment of building materials from *Japan* was announced in the HG for Dec. 9, 1869.

⁵⁶ *Littell's Living Age* (Boston) XXIII, 1849, p. 451.

⁵⁷ Jessie Benton Fremont, *A Year of American Travel* (San Francisco), 1960, p. 96. Happy Valley was near the present Palace Hotel on Market Street.

⁵⁸ Bayard Taylor, *Eldorado* (New York, 1850), I:109.

⁵⁹ *The London Illustrated News* in 1849 (Vol. XIV, p. 20) illustrated two models built for California. A New York manufacturer, Naylor, sent out nearly 600 of them in 1848-1849 to San Francisco, Valparaiso, Mazatlan and other places. "Their surfaces being bright, the rays of the sun are refracted, and the temperature within kept at a much lower degree than it would be otherwise." P, Mar. 2, 1850.

⁶⁰ P, Aug. 17, 1850.

These iron houses were generally clad with corrugated, galvanized iron. Various claims starting about 1829 were made for the invention of corrugated iron sheets. In 1837 galvanizing, or coating with zinc, was patented by I. M. Sorel of Paris. Charles E. Peterson, "Iron in Early American Roofs", *Smithsonian Journal of History*, Vol. 3, no. 3 (Fall, 1968) pp. 45-47.

⁶¹ P, Aug. 17, 1850.

⁶² In 1855 the Lyman House at Hilo was roofed with English iron. Ethel M. Damon, "Lyman House Memorial", n.d., n.p.

Tupper & Co. of London advertised corrugated iron in the P of Sept. 21, 1861 *et seq.* but in 1868, when it was used to cover the Rhodes Building, Kaahumanu Street, it was hailed as an innovation. HG, Aug. 25, 1868.

Cast iron facades, popular on the mainland from 1848 on, never seem to have been much used in Honolulu. (The oldest remaining American cast iron fronts, on the Laing Stores at Washington and Murray Streets, New York City (by Bogardus) were disassembled early in 1971 and stored for re-erection.) J. T. Waterhouse at Honolulu imported a "large iron-front warehouse" in 1869; this was the first and only example noted by the writer in the sources examined. *Ibid.*, Jan. 20, 1869.

The cast iron columns of the new Iolani Palace were contracted for by Savage & Son of San Francisco in 1879. *Archives of Hawaii, Iolani Palace File*. The Honolulu Iron Works, founded about 1852, was mostly preoccupied with sugar mill machinery, but did make the iron doors and shutters for the new Dillingham & Co. building (HG, July 17, 1872) and bid on a railing for Iolani Palace in 1881. *Iolani Palace File*.